

REMARKS

Support for the above amendment to Claim 1 can be found in original Claims 1 and 6. This amendment to Claim 1 serves to incorporate the subject matter of Claim 6 into Claim 1. No new matter has been added by the present amendment.

The present invention relates to a multi-stage process for the continuous preparation of thermoplastically processable polyurethane elastomers with tensile strengths greater than 30 MPa. This process comprises a) preparing a prepolymer I by reacting A) at least one diisocyanate, with B) at least a polyol 1 that has at least 1.8 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number average molecular weight of 450 to 10,000; b) reacting the prepolymer I, with C) a polyol 2 that comprises an organic phosphorus-containing compound and which has at least 1.5 and not more than 2.5 Zerewitinoff active hydrogen atoms and a number average molecular weight of 100 to 5,000, with polyol 2 being different than polyol 1, thus forming a prepolymer II, in which the equivalent ratio of NCO to the sum of NCO-reactive groups of polyols 1 and 2 is from 1.2:1 to 10:1 is established. This is followed by c) reacting this prepolymer II completely, in a high-viscosity reactor operating with a high shear energy, with D) at least one low molecular weight polyol or polyamine having at least 1.8 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number average molecular weight of 60 to 400. In accordance with the present invention, steps a) through c) are optionally carried out in the presence of F) catalysts, and optionally, E) up to 20% by wt. of auxiliary substances and additives. The overall equivalent ratio of NCO groups to the sum of NCO-reactive groups is from 0.9:1 to 1.2:1, based on the sum of all the reaction components of steps a) to c).

Rejections under 35 U.S.C. 103(a)

Claims 1-3, 5 and 8-9 were rejected under 35 U.S.C. 103(a) as being obvious over the Handlin et al reference (U.S. Patent 6,323,299).

The Handlin et al reference discloses a method for producing mixed polyol thermoplastic polyurethane compositions. This method comprises (a) reacting a polydiene with an isocyanate at 70 to 100°C for 10 to 60 minutes, adding to the

reaction product of (a) a polymeric diol and reacting these components at 70 to 100°C for 60 to 150 minutes to form a prepolymer, and (c) adding the chain extender and reacting these components at 70 to 125°C for 1 to 24 hours to form a thermoplastic polyurethane. These thermoplastic polyurethanes have a hard segment content 15 to 30% by wt., a tensile strength of at least 1500 psi (i.e. about 10.3 MPa) and a Shore A hardness of no more than 90.

Applicants respectfully submit that this rejection is moot in view of the preceding amendment to Claim 1. The subject matter of Claim 6 has been incorporated into Claim 1. Claim 6 was objected to as being dependent on a rejected base claim. Accordingly, Claims 1-5 and 7-9 are now in condition for allowance. Claims 1, 4, 5, 7 and 8 were rejected under 35 U.S.C. 103(a) as being obvious over the Murphy et al reference (U.S. Patent 3,165,566).

The Murphy et al reference discloses a process for making an elastic thread material comprising providing a low molecular weight polyurethane prepolymer which is the reaction product of a polymer having terminal hydroxyl groups and being a polyester and/or a polyether with an excess of an aromatic polyisocyanate; adding to the prepolymer a polyol material having terminal hydroxyl groups, with the components being present in proportion such that the number of equivalents of diisocyanate exceeds the number of equivalents of terminal hydroxyl groups in the polyomer and the polyol; extruding the mixture of prepolymer and polyol into a curing bath comprising a 2 to 20% by wt. solution of a polyfunctional amine compound having at least three functional amine groups for 15 to 120 seconds, washing the extruded thread material with alcohol to remove the polyfunctional amine compound from the surface thereof, and drying the thread material.

It is respectfully submitted that this rejection is moot in view of the preceding amendment to Claim 1. The subject matter of Claim 6 has been incorporated into Claim 1. Claim 6 was objected to as being dependent on a rejected base claim. In view of this amendment to Claim 1, Claims 1-5 and 7-9 are now in condition for allowance.

Claims 1, 2, 4 and 5 were rejected under 35 U.S.C. 103(a) as being obvious over the Asahi Chem reference (JP 59179513).


The JP 59179513 reference is directed to linear block polyurethanes with a high degree of transparency, homogeneity and high solution stability. The polymer is prepared by (1) reacting a polyether diol or (2) reacting the polyether diol with an excess of diisocyanate followed by reaction with the polyester diol, to form an isocyanate-terminated prepolymer, and polymerizing the prepolymer with a chain extender.

Applicants respectfully submit that this rejection of Claims 1, 2, 4 and 5 is moot in view of the preceding amendment to Claim 1. The subject matter of Claim 6 has been incorporated into Claim 1. In addition, Claim 6 was only objected to as being dependent on a rejected base claim. Applicants respectfully submit that the preceding amendment to Claim 1 places Claims 1-5 and 7-9 in condition for allowance.

In view of the preceding amendments and remarks, Applicants respectfully submit that each of the present rejections is moot. It is respectfully requested that Claims 1-5 and 7-9 be allowed.

Respectfully submitted,

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